ADMINISTRATIVE REPORT

For the Period

KENTUCKY GEOLOGICAL SURVEY

YEARS 1926 AND 1927

By

WILLARD ROUSE JILLSON

Director and State Geologist

KENTUCKY GEOLOGICAL SURVEY
FRANKFORT, KENTUCKY
1927

ADMINISTRATIVE REPORT

For the (Sixth)

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WILLARD ROUSE JILLSON
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PREPARED FOR THE GOVERNOR
AND THE LEGISLATURE

Six Illustrations and One Topographic Index Map of Kentucky

KENTUCKY GEOLOGICAL SURVEY
FRANKFORT, KENTUCKY
1925

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GOVERNING STATUTES

The acts creating and governing the (Sixth) Kentucky Geological Survey and making appropriations for same are three and are entitled as follows.

I. "An act creating the Kentucky Geological Survey, designating its chief executive officer and his duties, and providing funds for its maintenance."[1]

This act, in conjunction with the Budget Bill of 1924, provided a total of $28,000.00 for the maintenance of the various activities of the Kentucky Geological Survey. The appropriation is divided into two funds: (1) Co-operative topographic mapping fund of $17,500.00, and (2) General geological fund of $23,000.00. In accordance with the statute the first fund was to have been used in a "dollar for dollar" co-operation with the U. S. Geological Survey in an extension of the topographical base map of Kentucky. Unfortunately the appropriation of $17,500.00, though passed by the legislature in 1924 as in the past, was vetoed, and so was not available. The topographical base mapping outlined in the governing statute, therefore, could not be carried forward during the last two years. The second fund was appropriated in the budget of 1924 and has been used for the maintenance of the Kentucky Geological Survey proper, payment of salaries, field expense, and miscellaneous charges, including printing.

[1] Acts of the General Assembly of the Commonwealth of Kentucky, Chapter 34, p. 141. 1926.

II. "An act making an appropriation to the Kentucky Geological Survey, and declaring an emergency."[1]

Under this act funds in the sum of $17,000.00 were made available for geological investigations of various minerals of economic importance in Kentucky. This act was sufficiently expansive to allow for printing and necessary administrative detail. The money thus provided has been used in accordance with the specifications of this act.

III. "An act to repeal, amend and re-enact section 3 of chapter 34 of the Acts of the General Assembly of Kentucky, 1920 session, touching the Kentucky Geologipal Survey."[2]

This act amending section 3, chapter 34, of the Acts of 1920, relating to the Kentucky Geological Survey has operated to give the Director of the Survey a broader field of service to the people of Kentucky. By virtue of this act he becomes the curator of the collections of the Kentucky Geological Survey in the custody of the University of Kentucky at Lexington, and is authorized to arrange them for proper public preservation. He is given further authority to lecture on subjects pertaining to the geology, mineral and natural resources of Kentucky. The provisions of this Act have been complied with during the past biennium, as will be outlined later in the report.

PERSONNEL OF THE SURVEY

The personnel of geological assistants and trained office workers employed on the (Sixth) Kentucky Geological Survey during the past biennium is given below. All of these assistants with the exception of the Director's Secretary and Chief Clerk, are classified as "temporary employees" having been engaged for the summer field season of two or three months to do a special piece of geological or mineral resource investigation:

DIRECTOR AND STATE GEOLOGIST

WILLARD ROUSE JILLSON, B. S., M. S., Sc. D., Frankfort, Kentucky.[3]

ASSISTANT GEOLOGISTS

CHARLES HENRY RICHARDSON, Ph. D., Head of the Department of Mineralogy, Syracuse University, Syracuse, New York.

[1] Acts of the General Assembly of the Commonwealth of Kentucky, Chapter 128, pp. 483-4-5. 1924.
[2] Acts of the General Assembly of the Commonwealth of Kentucky, Chapter 140, pp. 485-86. 1924.
[3] Permanent employee.

STUART WELLER, Ph. D., Head of the Department of Paleontology, University of Chicago, Chicago, Illinois.

LEONIDAS CHAMBERS GLENN, Ph. D., Head of the Department of Geology, Vanderbilt University, Nashville, Tennessee.

HEINRICH RIES, Ph. D., Head of the Department of Geology, Cornell University, Ithaca, New York.

ARTHUR MCQUISTON MILLER, M. A. (Retired), Head of the Department of Geology, University of Kentucky, Lexington, Kentucky.

WALTER H. BUCHER, Ph. D., Department of Geology, University of Cincinnati, Cincinnati, Ohio.

FRANK LEVERETT, B. S., U. S. Geological Survey and Lecturer on Pleistocene Geology, University of Michigan, Ann Arbor, Michigan.

WALKER GREELEY BURROUGHS, M. S., Head of the Department of Geology, Berea College, Berea, Kentucky.

LOUIS W. CURRIER, M. S., Associate Professor of Mineralogy, Syracuse University, Syracuse, New York.

JAMES S. HUDNALL, B. S., Bowling Green, Kentucky.

J. MARVIN WELLER, B. S., University of Chicago, Chicago, Illinois.

THOMAS F. JACKSON, Ph. D., Bloomington, Indiana.

CHARLES VERNON THEIS, C. E., University of Cincinnati, Cincinnati, Ohio.

EUGENE S. PERRY, B. S., University of Chicago, Chicago, Illinois.

ARTHUR C. MCFARLAN, Ph. D., Head of the Department of Geology, University of Kentucky, Lexington, Kentucky.

L. C. ROBINSON, S. M., University of Kentucky, Lexington, Ky.

GEOLOGIC AIDES

SAMUEL M. MAYFIELD, B. S., Berea College, Berea, Kentucky.

GEORGE W. PIRTLE, B. S., Elizabethtown, Ky.

GEORGE W. MORRIS, A. B., Harvard University, Cambridge, Mass.

JOHN GRANT WOODRUFF, B. S., Cadiz, Kentucky.

JOHN ARCHER CULBERTSON, A. B., S. M., Hanover, Indiana.

HUBERT DIXON CRIDER, B. S., Marion, Kentucky.

R. C. LANE, Fulton, Kentucky.

GEOGRAPHERS

DARNELL HAUG DAVIS, Ph. D., Head of the Department of Geography, University of Minnesota, Minneapolis, Minnesota.

CARL O. SAUER, Ph. D., Head of Department of Geography, University of California, Berkeley, California.

VARIOUS ASSISTANTS—TEMPORARY

W. D. FUNKHOUSER, Ph. D., Head of the Department of Zoology, University of Kentucky, Lexington, Kentucky.

CHARLES STEVENS CROUSE, M. S., Professor of Metallurgy, University of Kentucky, Lexington, Kentucky, Oil Shale Technologist.

A. M. PETER, Sc. D., Head of the Department of Chemistry, Agricultural Experiment Station, University of Kentucky, Lexington, Kentucky, Chemist.
WARREN R. KING, C. E., U. S. Geological Survey, Division Water Resources, Chattanooga, Tennessee, Water Resource Engineer.
F. W. BERTSCH, A. B., University of Cincinnati, Cincinnati, Ohio, Draftsman.
E. B. BOSTON, Columbia, Ky., Civil Engineer.
E. D. PHILLIPS, Marion, Ky., Field Assistant.
A. B. WILLIAMS, Frankfort, Kentucky, Civil Engineer.
R. L. HARRISON, Washington, D. C., Civil Engineer and Topographer.
J. F. COSICK, Frankfort, Kentucky, Photographer.
W. M. EASLEY, Frankfort, Kentucky, Draftsman.
JACK D. JILLSON, Utica, New York, Rodman.
OTTO A. ROTHERT, Louisville, Kentucky, Copy Reader and Indexer.
WM. H. LAMBERTH, Memphis, Tennessee, Civil Engineer.
E. H. MARRS, Lawrenceburg, Kentucky, Accountant.
E. V. T. CASWELL, Lexington, Kentucky, Copyist.
R. H. DEMPF, Louisville, Kentucky, Rodman.
MISS L. E. AKERS, Cave City, Kentucky, Copyist.
V. H. WOLFORD, Frankfort, Kentucky, Accountant.
D. B. VENTRE, Chattanooga, Tennessee, Hydrographic Engineer.
JAMES WATT RAINE, Copy Reader, Berea, Kentucky.
F. O. GARDNER, Lexington, Kentucky, Chemist.
W. J. Wright, Field Assistant, Frankfort, Kentucky.
G. H. MAYS, Frankfort, Kentucky, Copy Reader.
W. A. SHELTON, Vine Grove, Ky., Civil Engineer.
CRAWFORD DICKEY, Shelbyville, Kentucky, Assistant Topographer.
MISS M. E. WATTS, Washington, D. C., Draftsman.
J. F. MARTIN, Washington, D. C., Civil Engineer.
LEWIS BLACKWELL, Bowling Green, Kentucky, Civil Engineer.
JOSEPH L. BISSELL, Frankfort, Kentucky, Draftsman.
W. A. GIBBONS, Frankfort, Kentucky, Rodman.
P. B. WINN, Winchester, Kentucky, Field Assistant.
MISS C. E. STRANGE, Bowling Green, Kentucky, Copyist.
MISS H. E. MILLER, Big Bone, Kentucky, Field Assistant.
MISS C. B. MCNAMARA, Frankfort, Kentucky, Secretary.[1]
MISS H. M. SCOTT, Frankfort, Kentucky, Chief Clerk.[1]
J. M. FRASURE, Chief Clerk (Resigned.)[1]

SUMMARY OF ACTIVITIES

During the past biennium (1924-25) the work of the Kentucky Geological Survey has consisted of various detailed and general geological and mineral resource investigations distrib-

[1] Permanent employees.

uted throughout Kentucky. In the fluorspar field of Livingston and Crittenden Counties, Dr. Stuart Weller has continued his studies of the structure and stratigraphy of the Mississippian rocks and their contained deposits of fluorspar. His work has been confined chiefly to the Cave-in-Rock Quadrangle. The completion of this work has been delayed due to the necessary revision of the topographic base map in two or three small areas north of Marion. The manuscript covering this work, the preparation of which was announced in a previous administrative report, has now been revised, and with a geological map, is ready for the printer, but has not been published, due to lack of funds.

A report of state-wide significance entitled "Mineralogy of Kentucky," has been prepared by Dr. Chas. H. Richardson. In writing this new report Dr. Richardson has made use of his field notes prepared during four years of work on the Kentucky Geological Survey concerning various minerals occurring either in specific or commercial quantity in Kentucky. During the past year Dr. Richardson has executed the field work and prepared two reports which will be published as a unit volume No. 29, as follows: Part 1, "Molding Sands of Kentucky," and Part 2, "Cement Materials of Kentucky." Each of these reports is state-wide in its application, and they are in direct conformity with the recent act of the legislature providing for detailed investigation of mineral resources and road and cement materials.

During the past two years Dr. L. C. Glenn has been engaged in a study of the coal measures of the entire Western Kentucky Coal Field, the plan being to map the various important commercial coals of this field and run the outcrops of the major stratigraphic units, the Pottsville, Allegheny, Conemaugh and Monongahela. Field work in 1926 will be required to complete the field work, after which the office work of manuscript preparation will be rapidly advanced.

A reconnaissance report entitled "Surface Formations of Northern Kentucky," has been prepared as a result of field work executed by Professor Frank Leverett, geologist of the U. S. Geological Survey, during the field season of 1924. During 1925 Professor Leverett confined himself almost entirely to the examination of the Pleistocene deposits and surface features of Northern and Central Kentucky.

Dr. Walter H. Bucher, whose field studies of the geology of the Jeptha Knob in Shelby County, Kentucky, were completed as announced in the last administrative report, has revised his manuscript following detailed investigation of a considerable body of pertinent geological literature of Europe while abroad last year. This report is now published and available in volume 21, Series VI, Ky. Geol. Survey, "Oil Shales of Kentucky."

Dr. Carl O. Sauer, with a corps of assistants, has been engaged during the last three years in executing the field work and preparing manuscript of the geography of the Mississippian plateau in Kentucky. This manuscript with drawings and photographic illustrations has now been finished and is ready for the printer. It is numbered volume 25, and is entitled "Geography of the Pennyroyal Plateau." It is in every way a very first-class piece of modern scientific geography and will be of much value in assisting Kentuckians to interpret the many natural and mineral resource opportunities present in this extensive region.

Within the last year volume VIII of Series VI, entitled, "The Clay Deposits of Kentucky," became exhausted, due to an unusually insistent demand. Accordingly Dr. H. Ries, of Cornell University, who originally prepared this report, was re-engaged to revise the report and bring it up-to-date. The revised manuscript with much new data is now completed and ready for the state printer.

During the past two years Mr. James S. Hudnall has been engaged in an extension of structural and stratigraphic studies in the Eastern Kentucky Coal Field, these having resulted in published oil and gas structural maps I the Paint Creek Uplift, II Boyd, III Perry, and IV Leslie Counties. His work is also represented in part of published maps of V Knox, VI Carter, VII Morgan and a regional structural map of parts of VIII Estill, Jackson, Lee, Rockcastle and Madison Counties.

Professor Louis W. Currier commenced the study in 1925 of the vein ores of Kentucky. Examinations completed are confined to the Blue Grass Region, but during 1926 will be extended to Central and Western Kentucky and will include a detailed investigation of all important deposits of lead, zinc, barite, calcite and fluorspar in this state.

In accordance with an act of the last legislature special investigations relative to the occurrence of rock asphalt in western Kentucky have been undertaken for the Survey by J. Marvin Weller and Thomas F. Jackson; these investigations being confined largely to Edmonson County, the heart of the rock asphalt field of the state. The field work and subsequent manuscript for this report have been completed, and this work is now ready for the state printer. It is known as Volume 28, "Geography of Edmonson County."

Dr. W. D. Funkhouser has been engaged during the past two years in preparing a report on the prehistoric life of Kentucky. This report discusses the occurrence of animal and human life within this Commonwealth before the advent of civilized explorers. Much of the volume will have to do with the influence of the geology and physiography upon the various life forms, particularly Mound Builders and the Indian. While distinctly not archaelogical in its central motive, this report will have much in it of archaeological as well as general geological interest.

During the past biennium the Survey has been engaged in the preparation of a new drainage and political base map of Kentucky, which has been very badly needed because of the great inaccuracy of the one now in use. This work was undertaken by Mr. R. L. Harrison and Mr. W. H. Gill, engineers of the U. S. Geological Survey, Washington, D. C. In preparing the new base map the best and most modern detailed regional maps were used. For the first time in the history of Kentucky maps of one kind or another and of sufficient accuracy were available for every part of the state. Detailed topographic maps for about 51% of Kentucky were used. In the remaining areas county maps generally of the scale of 1 inch to the mile were used. The resulting state map scale 1:500,000 is very detailed and accurate. As soon as this map is issued Kentucky will have a base map upon which the state, county, political, drainage and other lines, including the through highways, the cities and the towns are accurately located geographically. This map is now in the hands of the printer and will be issued during the coming year.

Detailed areal geological maps have been made of Lewis County by Prof. E. S. Perry, and of Morgan County by Prof. L. C. Robinson. The Morgan County area has also been made the subject of a preliminary geological report, which has been

written by Prof. Robinson. It discusses the stratigraphic and structural geology of the region and outlines the mineral resources and their economic importance.

During the year 1924 Mr. R. L. Harrison has prepared a manuscript topographic map of Kentucky, scale 1:500,000. The interval of this map is 200 feet. The data used in this map was derived directly from topographic maps covering 51% of the state, and sufficiently distributed to reveal the topographical characteristic of Kentucky. Areas intervening were run in with aneroid in more or less detail by various workers on the Kentucky Geological Survey. In this colaborative manner there were supplied sufficient data to prepare the first topographical base map of Kentucky. This manuscript is now completed and in the hands of the printer, and will be issued using the new base map some time during the coming year. Kentucky takes high rank in preparing this map of the Commonwealth, as such maps have only been prepared by one or two other states.

The past field season of 1925 has been largely devoted by the Kentucky Geological Survey to the running of outcrops throughout the state in preparation, under the direction of the State Geologist Dr. W. R. Jillson, of a new and much needed geological map of Kentucky. The eastern coal field was divided into three parts, the Pottsville, Allegheny and Conemaugh by Mr. James S. Hudnall and Dr. C. T. Wentworth. Mr. Hudnall's province consisted of the area north of the Pine Mountain. Dr. Wentworth's province consisted of the Middlesboro syncline. The western Kentucky coal field as referenced above was divided by Dr. L. C. Glenn into the Pottsville, Allegheny, Conemaugh and Monongahela. The Mississippian outcrop was covered in reconnaissance by Dr. Stuart Weller, who was assisted by Prof. A. C. MacFarlan in eastern Kentucky, and by Dr. Richard Foster Flint and Mr. J. M. Weller in central and western Kentucky. These men, with their assistants, divided the Mississippian formations into the Chester, Meramec and Osage groups and ran the areal outcrop of same.

Dr. T. E. Savage with a party completed studies of the entire Devonian outcrop in Kentucky. This work will be used on the new geological map of the state and will also lead to detailed outcrop maps, and a reconnaissance report covering strati-

graphic and structural as well as areal features of the entire Devonian in Kentucky.

WORK BY THE DIRECTOR

The State Geologist, Dr. Willard Rouse Jillson, in addition to his administrative and executive duties as Director of the Kentucky Geological Survey, has found time to carry forward considerable geological research during the past biennium, and has published a number of shorter articles on economic, physiographic and glacial geology of Kentucky. Several of these papers were originally presented by him as addresses before educational, scientific and lay bodies in Kentucky and elsewhere. A list of these shorter publications and books follows:

ADMINISTRATIVE REPORT (1922-1923)

Covering the activities o fthe Sixth Kentucky Geological Survey. Prepared for the Governor and the Legislature. 1 illus., 1 topographic index map. Kentucky Geological Survey, Series VI. 1923.

KENTUCKY STATE PARKS:

A brief presentation of the Geology and Topography of Some Proposed State Park Areas Based upon Original Field Investigation. 85 pages. Presidential Address, Kentucky Academy of Science. Kentucky Geological Survey, Frankfort, Ky. 1924.

FAULT PATTERN OF KENTUCKY:

The Pan-American Geologist. Vol. XLI., Feb., 1924. Geol. Pub. Co., Des Moines, Iowa.

NEW RELIEF MAP OF KENTUCKY:

The Pan-American Geologist, Vol. XLI., Feb., 1924. Geol. Pub. Co., Des Moines, Iowa.

KENTUCKY CANNEL COALS:

The Pan-American Geologist, Vol. XLI., March, 1924, pp. 87-98. Geol. Pub. Co., Des Moines, Iowa.

PRIMEVAL TRACTS OF KENTUCKY:

The Pan-American Geologist, Vol. XLI, April, 1924, pp. 169-175. Geol. Pub. Co., Des Moines.

KENTUCKY ROCK ASPHALT:

The Pan-American Geologist, Vol. XLI, May, 1924, pp. 251-259. Geol. Pub. Co., Des Moines.

AMERICAN KARST COUNTRY:

The Pan-American Geologist, Vol. XLII, August, 1924. Geol. Pub. Co., Des Moines, 1924.

GLACIAL PEBBLES IN EASTERN KENTUCKY:

Science, Aug. 1, 1924, Vol. LX, No. 1544, pp. 101-102, 1924.

COAL INDUSTRY IN KENTUCKY:

Kentucky Geological Survey, Series VI, Vol. XX, 144 pp. 1924.

GLACIATION IN EASTERN KENTUCKY:
The Pan-American Geologist, Vol. XLII, pp. 125-133, Sept., 1924. Presented before the Geological section of the British Association for the Advancement of Science at Toronto, Canada, Aug. 11, 1924. Geol. Pub. Co., Des Moines, 1924.

EARLY MINERAL EXPLORATIONS IN THE MISSISSIPPI VALLEY: (1540-1840) Pub. 31, Ill. State Hist. Lib. Trans. of the Ill. State Hist. Soc., Year 1924, pp. 41-57, Springfield, 1924.

OUTLOOK FOR MINERAL DEVELOPMENT IN KENTUCKY:
The South's Development-Manufacturers' Record, Part II, pp. 374-75, Baltimore, Dec. 11, 1924.

AGRICULTURAL PERSPECTIVE OF KENTUCKY GEOLOGY:
The Pan-American Geologist, Vol. XLIV, Nov. and Dec. 1925, pp. 295, 305, 337 and 396. Geol. Pub. Co., Des Moines, 1925. Also with additions in 26th Biennial Report, Ky. State, Dept. of Agr., pp. 103-132, illustrated, Frankfort, Ky., Dec., 1926.

RESUME OF KENTUCKY MINERAL RESOURCES:
26th Biennial Report Kentucky State Department of Agriculture, pp. 13-25, illustrated, Frankfort, Ky., Dec., 1926.

STATE PARKS IN KENTUCKY:
Anniversary Address Perryville Battlefield, Perryville, Ky., Oct., 1925. 26th Biennial Report, Ky. State Dept. of Agr., pp. 159-....., illustrated, Dec., 1925.

RECENT GEOLOGICAL INVESTIGATIONS IN KENTUCKY:
The Kentucky Outlook, Vol. II, No. 2, p. 6, Jan. 9, 1926.

Dr. W. R. Jillson has now in preparation a manuscript entitled, "The Topography of Kentucky," which will be Volume 30 in the Survey's series. This report describes the surface features of this state and their geological causes. It also outlines the influence of these physiographic features on the social and economic development of the people of this state. The Director has prepared a new small geological map of Kentucky showing oil and gas, coal and fluorspar, and rock asphalt fields. This map has been published and is now available. Dr. Jillson has also executed the field work necessary to secure the data and has prepared a new map of the subsurface structural geology of Boyd County, using as datum plane the black Sunbury (Mississippian) shale. This map has been published and has been much in demand in this part of Kentucky.

The Director of the Kentucky Geological Survey was made Curator of the collections of the Survey lodged at the University of Kentucky by an act of the last (1924) legislature. During the past biennium the Director has taken steps looking toward the

rearrangement of these important mineral collections so as to enhance their specific, comparative and educational value to the people of the state. This work is now going forward and will be continued during the next two years.

NEW MAPS OF COUNTIES

In the course of the several investigations carried on during the past two years all of the counties in Kentucky have been included, some generally, some in detail. Most of the counties appear in all of the reports either directly or indirectly. Detailed geological investigations, however, have necessarily had to be confined to areas which had been previously topographically base mapped, as no other accurate base map exists on which accurate elevations are to be found.

Within the last biennium the Kentucky Geological Survey under the personal supervision of the State Geologist, has prepared a series of new reconnaissance black and white geographical county maps. Most of these are for counties which have never been mapped. The scale in most instances is: 1 inch equals one mile. These maps are essentially road and stream maps. They do not carry elevations, and are not suitable for detailed geological work, but are suitable for and much in demand by tourists, farmers, road engineers, sanitary engineers, contractors, geologists and many others. The counties so mapped were Fulton, Trigg, Oldham, Mason, Todd, Logan, Simpson, Bullitt, Hardin, Larue, Hart, Casey, Trimble, Russell, Pulaski, McCreary, Robertson, Nicholas, Rowan and Greenup—a total of twenty.

Detailed oil and gas structural geological maps have been prepared for (1) Paint Creek Uplift, showing portions of Floyd, Johnson, Magoffin, Morgan, Lawrence and Elliott Counties, Ky.; (2) Knox County; (3) region south of Berea, including portions of Estill, Lee, Jackson, Madison and Rockcastle Counties; (4) for a portion of Elliott County; (5) Carter County; (6) Boyd County; (7) Greenup County, and (8) portions of Cumberland, Monroe and Clinton Counties.

New oil and gas maps have been prepared for Taylor, Clinton, Wayne and Barren Counties. An areal geological and structural oil and gas map has been prepared for Morgan County by L. C. Robinson and J. S. Hudnall; and an areal geological map has been prepared for Lewis County by Prof. E. S. Perry A

geological map of Adair County has been prepared from the notes of Professor A. M. Miller. Dr. A. C. MacFarlan and George W. Pirtle have been engaged in preparing a geological map of Jessamine County at various times during the past two years. With Prof. L. C. Robinson Dr. MacFarlan is now engaged in preparing a geological map of Fayette County, the base of which is being prepared by W. C. Eyl.

A recapitulation of the mapping program of the Kentucky Geological Survey during the past two years as outlined above indicates that forty-five (45) counties have been mapped either geographically or for some particular mineral. The scale used in most instances has been 1 inch to the mile. The maps are detailed enough to show practically every dwelling within the areas covered. As a result the demand for these maps has been very great, and every indication points to the fact that it will increase. The total area mapped in detail during the past biennium is about 15,850 square miles or about 38% of the area of Kentucky

In addition to its several activities as outlined above the Kentucky Geological Survey has continued during the past two years its co-operative program of water resource work with the U. S. Geological Survey. Mr. Warren R. King, engineer of the U. S. Geological Survey, with offices in Chattanooga, Tenn., has been in charge of the work of stream gauging and flow measurements on the Green, Kentucky, Big Sandy and Cumberland rivers. Funds for this work have been furnished by the U. S. Geological Survey, while the Kentucky Geological Survey has undertaken to publish the records. The Kentucky Geological Survey has also co-operated with the U. S. Bureau of Mines and the U. S. Bureau of the Census in securing information relative to some of the mineral resources produced in Kentucky.

NEW BOUND PUBLICATIONS

The following new publications have been prepared during the past biennium, 1924-25. Some of these, such as Vol. 24 and Vol. 27, have already been published. Others are now being printed or are ready for the state printer.

Vol. 8.—Clay Deposits of Kentucky. 2d Ed. Revised. H. Ries, 1925 (Mss.)

Vol. 23.—Geography of the Blue Grass. D. H. Davis. 1925 (In Press.)

Vol. 24.—Geography of the Western Coal Field W. G. Burroughs. 1925.

Vol. 26.—Geography of the Pennyroyal. C. O. Sauer. 1925. (In Press.)
Vol. 26.—Geology of Cave-in-Rock Quad. S. Weller. 1925. (In Press.)
Vol. 27.—Mineralogy of Kentucky. C. H. Richardson. 1925.
Vol. 28.—Geology of Edmonson County. J. M. Weller. 1925. (In Press.)
Vol. 29.—Molding Sands and Cement Materials of Kentucky. C. H. Richardson. 1925. (Mss.)
Vol. 30.—Topography of Kentucky. W. R. Jillson. 1926. (Mss.)
Vol. 31.—Surface Formations of Northern Kentucky. Frank Leverett. 1925. (Mss.)
Vol. 32.—Pennsylvanian Faunas of Eastern Kentucky. W. C. Morse. 1925. (Mss.)

PUBLISHED REPORTS

SIXTH GEOLOGICAL SURVEY
(1920-1925)

The record of published reports of the Sixth Kentucky Geological Survey is interesting because of the broad field of investigations covered. Up to the present time the Survey has issued twenty-one separate volumes totaling 5,179 pages. The titles of these reports, some of which are already exhausted in edition, are given in the next table. Following this is presented a tabulation of the pages of the new published geological reports of each of the several State Geological Surveys of Kentucky, from 1838 to 1925.

BOUND VOLUMES ON KENTUCKY GEOLOGY

		Year	Vol. No.	No. Pages
1.	Glass Sands of Kentucky—Richardson	1920	I.	149
2.	Economic Papers on Kentucky Geology —Jillson	1921	II.	304
3.	Oil Field Stratigraphy of Kentucky—Jillson	1922	III.	738
4.	Geology of the Golconda Quadrangle—Weller	1921	IV.	148
5.	Geology and Coals of Webster County—Glenn	1922	V.	349
6.	The Sixth Geological Survey—Jillson	1921	VI.	251
7.	Mississippian Series of Eastern Ky.—Butts	1922	VII.	188
8.	Clay Deposits of Kentucky—Ries	1923	VIII.	241
9.	Geography of the Jackson Purchase—Davis	1923	IX.	185

10.	Geology of Princeton Quadrangle—Weller	1923	X.	163
11.	Building Stones of Kentucky—Richardson	1923	XI.	355
12.	Fluorspar Deposits of Kentucky—Currier	1923	XIII.	189
13.	Surface Waters of Kentucky—King	1923	XIV.	190
14.	Geological Research in Kentucky—Jillson	1923	XV.	328
15.	Wild Life in Kentucky—Funkhouser	1925	XVI.	385
16.	Geography of the Kentucky Mountains—Davis	1924	XVIII.	180
17.	Coal Industry in Kentucky—Jillson	1924	XX.	164
18.	Oil Shales of Kentucky—Thiessen, White, Crouse	1925	XXI.	242
19.	Road Materials of Kentucky—Richardson	1924	XXII.	209
20.	Geography of the Western Coal Field—Burroughs	1925	XXIV.	211
21.	Mineralogy of Kentucky—Richardson	1925	XXVII.	170
	Total number of pages			5,179

BOUND REPORTS OF THE STATE GEOLOGICAL SURVEYS OF KENTUCKY (1838-1925)

Survey	Period	Duration	Pages New Reports
W. W. Mather	1838	1 year	39
D. D. Owen	1854-1860	4 years	2013
N. S. Shaler	1873-1880	7 years	3886
J. R. Procter	1880-1892	12 years	1624[1]
C. J. Norwood	1904-1912	8 years	2761
J. B. Hoeing	1912-1918	6 years	4389
W. R. Jillson	1918-1925	7 years	6952[2]

TOPOGRAPHICAL BASE MAPPING

During the past biennium the Kentucky Geological Survey has been unable to enter into a co-operative topographical agreement with the U. S. Geological Survey for quadrangular base mapping in Kentucky, due to the fact that the specific annual appropriation for this purpose of $17,500.00 made by the

[1] During this same time Procter reprinted 1,336 pages of geological reports prepared by N. S. Shaler.

[2] This figure includes 1,773 pages prepared under the supervision of the present State Geologist and published by the Dept. of Geology and Forestry of Kentucky from 1918-1920.

legislature in 1924 was vetoed by the Governor. A small amount of money was withdrawn from the general geological fund to complete the Scottsville, Cub Run and Mt. Eden quadrangles, each of which was nearly finished when the funds were withdrawn. 194 square miles of new work was completed on the unfinished Taylorsville quadrangle when the work was stopped down. All of this work was done for publication at the scale 1:62,500 with a contour interval of 20 feet. Some revision was done on the unpublished Cave-in-Rock (Marion, Crittenden County) quadrangle by the U. S. Geological Survey without cost to the Kentucky Geological Survey. The Cub Run quadrangle is now completed and available as an engraved map. The Scottsville has been issued as a preliminary photolithograph and will soon be engraved. The Mt. Eden quadrangle is now in the hands of the engraving department of the U. S. Geological Survey, and will be issued early in 1926. Almost exactly 51% of the area of Kentucky is now topographically base mapped.

If funds are provided for the resumption of topographical base mapping by the legislature during the 1926 session, this work which is now so urgently demanded by many people throughout the state will be reundertaken on July 1, 1926, and advanced as rapidly as possible towards its completion. The opinion of the public and the press with respect to this urgent matter is well reflected in a recent editorial from the Lexington Herald, which follows:

FOR GEOLOGICAL SURVEY.[1]

"Civic Clubs of Ashland, Louisa, Grayson and Greenup have joined in an effort to have the legislature of Kentucky make an appropriation at its coming session for $50,000 with which to make a geological survey and topographical base maps showing the oil, coal, fire clays, brick clays, shale and other resources of Boyd, Carter, Greenup and Lawrence Counties. Topographical base maps and a geological survey will turn a searchlight upon the buried talents in all the counties where a 'quadrangle' is surveyed. The surveys and mapping will do more.

"Numbers of industries considering locations and dependent upon the existence of certain resources in the vicinity of their plant sites, write to the geological surveys of various states. They ask for information concerning locations. In regard to many counties the Kentucky Geological Survey must write to them, expressing its belief that certain resources are contained, but acknowledging that no survey has been made and admitting, 'this has not been mapped.'

[1] Editorial, Lexington Herald, December 25, 1925.

"The industry, of course, then scratches the Kentucky county off its list if it can find what it desires, for instance, in West Virginia, which is 100 per cent topographical base mapped, or Ohio, which is 100 per cent topographical base mapped, or Illinois, which is spending $60,000 a year for surveys and mapping.

"The state highway department uses the maps made by the geological survey. If the state does not appropriate funds for these maps to be made by the survey, the highway department will have to spend its income for such maps, which is merely a departmental demonstration of robbing Peter to pay Paul. It is worse, however, in that maps of the highway department would have no value for any other purpose than road construction.

"At present of the 40,598 square miles of Kentucky, only approximately half of the state's area has been mapped. With the exception of the Kenova quadrangle, the northern counties of central and eastern Kentucky, the 'camel's back' on the map of Kentucky, are not base mapped. The federal government will pay half of the cost of the geological surveys and will make the maps."

VALUE OF PHYSICAL PROPERTIES

At the request of the State Auditor, the Director of the Kentucky Geological Survey has inventoried the physical properties of this state department and summarized their cost and value. These have been tabulated by groups and total $48,853.00, the investment period as indicated below extending from 1920 to 1925 inclusive, except in the item of library, a portion of which is probably fifty years old.

Estimates of Values and Expenditures for Improvements and Printing, Kentucky Geological Survey, since 1920-1925 inclusive:

Office furniture, including typewriters, etc.	$2,330.00
Instruments, field and drafting	1,775.00
Permanent improvements including stock filing devices, etc.	2,835.00
Mineral and fossil collections for cabinet	8,000.00
Reports, maps, publications, etc.	32,913.00
Kentucky Geol. Survey Library, 6350 vols., pamphlets and maps*	9,520.00
Total	$58,373.00

MINERAL RESOURCE PRODUCTION

During the last several years mineral resource development has been very active in Kentucky. This has been particularly true in coal, oil, natural gas, fluorspar and rock asphalt. Other materials such as building stones, clays, sands, gravels, etc., have

*Number of cloth bound volumes, paper pamphlets and maps is an estimate.

had a slower, though steady, increase. The total annual value of Kentucky's mineral resources and mineral products is estimated to be about $200,000,000.

The volume and value of a few of the outstanding minerals of Kentucky is given herewith:

COAL PRODUCTION IN KENTUCKY.*

	Volume	Value
1921	30,282,659 tons	$81,460,352.00
1922	42,134,175 tons	127,037,040.60
1923	43,143,962 tons	113,542,000.60
1924	46,387,732 tons	88,745,968.00
	Total	$410,785,320.00

OIL PRODUCTION IN KENTUCKY

	Volume	Value
1921	9,030,845 bbls.	$33,556,241.00
1922	8,839,303 bbls.	17,532,766.00
1923	8,087,350 bbls.	15,189,916.00
1924	7,437,332 bbls.	14,413,982.00
	Total	$80,697,905.00

ROCK ASPHALT

	Tons	Value
1923	139,401	$1,115,208.00
1924	245,929	1,967,432.00
1925	240,841	1,926,928.00
		$5,010,068.00

FLUORSPAR PRODUCTION IN KENTUCKY

	Volume	Value
1921	18,670.11 tons	$360,146.42
1922	63,322.30 tons	1,170,194.25
1923	56,203.34 tons	1,181,509.47
1924	46,738.07 tons	965,849.20
	Total	$3,678,719.34

NATURAL GAS PRODUCTION IN KENTUCKY*

	M. Cu. Ft. Volume	Value
1921	4,820,000	$1,597,000.00
1922	5,872,000	1,879,000.00
	Total	$3,476,000.00

* From records of the U. S. Geol. Survey.

CLAY PRODUCTION IN KENTUCKY

	Volume	Value
1921	35,591 tons	$204,400.00
1922	67,591 tons	270,363.60
1923	103,195 tons	428,021.60
	Total	$903,279.00

HYDRO-ELECTRIC DEVELOPMENT.*

Active applications for hydro-electric power projects in Kentucky under Federal jurisdiction have greatly increased during the last two years. The following list indicates the activity in developing this natural resource of Kentucky at the present time. Similar activity is in progress in Tennessee.

283 NAME: Louisville Gas & Electric Co.
ADDRESS: Louisville, Ky.
APPLYING FOR: Preliminary permit.
PROJECT: To develop power at dam No. 41 in Ohio river, at Louisville, Ky., which dam the U. S. government proposes to construct, the new dam to have an increased height of about 6 feet.
PROPOSED USE: Public Utility. License issued Nov. 11,1 -935.

304 NAME: The Winchester Water Works.
APPLYING FOR: Preliminary permit.
PROJECT: Develop power at U. S. Lock and Dam No. 10, in Kentucky river, the power to pump water about 4 miles to the company's existing reservoir, supplying water to Winchester. Preliminary permit issued March 4, 1924.
PROPOSED USE: For pumping domestic water supply.

333 NAME: Cumberland Hydro-Electric Company.
ADDRESS: No. 1011 Fletcher Savings & Trust Building, Indianapolis, Indiana.
ADDRESS: 14 Beacon street, Boston, Mass.
APPLYING FOR: Preliminary permit.
PROJECT: Three dams and power houses, just above Burnside, Ky., and at Cumberland Falls in Cumberland river, and in the South Fork of Cumberland a short distance above its mouth.
Preliminary permit issued March 24, 1924.
PROPOSED USE: Public utility.

473 NAME: Kentucky Northern Power Co.
ADDRESS: Frankfort, Ky.
APPLYING FOR: Preliminary permit.
PROJECT: *Dam in Licking river about 3 miles above Falmouth.
PROPOSED USE: Public utility. Preliminary permit issued June 26, 1924.

*Data from O. C. Merrill, Ex. Secy. Fed. Power Comm., Washington, D. C. Dec. 15, 1925.

537 NAME: Louisville Hydro-Electric Co.
ADDRESS: Louisville, Ky.
APPLYING FOR: Preliminary permit.
PROJECT: 100-foot dam in Green river, near Mammoth Cave, Edmonson and Hart counties, Kentucky.
PROPOSED USE: Public utility. Preliminary permit issued May 29, 1925.

539 NAME: Kentucky Hydro-Electric Co.
ADDRESS: Louisville, Ky.
APPLYING FOR: Preliminary permit.
PROJECT: Power plants at Locks 1-7 inclusive in Kentucky river, in Henry, Owen, Carroll, Franklin, Anderson, Woodford, Mercer, Fayette, Jessamine and Garrard Counties, Kentucky.
PROPOSED USE: Public utility. Peliminary permit issued May 28, 1925.

540 NAME: Kentucky Hydro-Electric Co.
ADDRESS: Louisville, Ky.
APPLYING FOR: Preliminary permit.
PROJECT: Power plants at Locks 8-14 inclusive in Kentucky river in Madison Jessamine, Clark, Estill and Lee Counties, Kentucky.
PROPOSED USE: Public utility. Pending.

545 NAME: Offutt, Loughridge, Gunn & Hifner, Jr.
ADDRESS: 205 First and City National Bank Building, Lexington, Ky.
APPLYING FOR: Preliminary permit.
PROJECT: Power plant in North Fork of Kentucky river near Airdale, Kentucky, developing about 47,000 horse-power.
PROPOSED USE: Public utility.

546 NAME: Offutt, Loughridge, Gunn & Hifner, Jr.
ADDRESS: 205 First and City National Bank Building, Lexington, Ky.
APPLYING FOR: Preliminary permit.
PROJECT: Power project at each government dam on Kentucky river known as Locks Nos. 8 to 14, inclusive (from High Bridge to Beattyville).
PROPOSED USE: Public utility. Pending.

551 NAME: Kentucky-Tennessee Light & Power Co.
ADDRESS: Bowling Green, Ky.
APPLYING FOR: Preliminary permit.
PROJECT: Power plants at government dam in Barren river and Nos. 4, 5 and 6 in Green river, in Warren, Butler and Edmonson Counties, Kentucky, developing about 1,349 horse-power.
PROPOSED USE: Public utility. Preliminary permit issued May 28, 1925.

566 NAME: Kentucky Hydro-Electric Co.
ADDRESS: Louisville, Ky.
APPLYING FOR: Preliminary permit.
PROJECT: 1160-foot dam about one mile above Booneville, with appurtenant power structures, South Fork Kentucky river, Owsley and Clay Counties, Kentucky, near Booneville and Manchester.
PROPOSED USE: Public utility. Pending.

604 NAME: Kentucky Hydro-Electric Co.
ADDRESS: Louisville, Ky.
APPLYING FOR: Preliminary permit.
PROJECT: Power development in North Fork of Kentucky river, about one mile upstream from Aardale, in Lee, Wolfe and Breathitt counties, Kentucky.
PROPOSED USE: Public utility. Pending.

613 NAME: Kentucky-Tennessee Light & Power Co.
ADDRESS: Bowling Green, Ky.
APPLYING FOR: Preliminary permit.
PROJECT: Power plant on east bank of Green river, immediately below U. S. Dam No. 1, in Henderson county, Kentucky. The installation will have a primary capacity of 792 hours-power.
PROPOSED USE: Public utility. Pending.

617 NAME: Kentucky-Tennessee Light & Power Co.
ADDRESS: Bowling Green, Ky.
APPLYING FOR: Preliminary permit.
PROJECT: Power development at Locks 2 and 3, Green river, McLean and Muhlenberg counties, Kentucky, (near Henderson and Bowling Green).
PROPOSED USE: Public utility. Pending.

CONSERVATION

In Kentucky, as in many other Commonwealths in the United States, the natural resources of the land have in some instances been exploited to the evident detriment of the public good. The individual exploitation of the mineral resources of this or any other country is only justified by the continuance or the improvement of the public welfare. Wasteful and destructive mineral operations of any kind, though legal and temporarily productive of substantial individual gain, find nothing in sound public economics to recommend their continuance. Only in times of real national emergency are such operations to be justified.

The wealth of Kentucky as an integral part of the nation is to a very large degree based upon an intelligent, extensive, yet

conservative development of all natural and mineral resources. Conservation in this proposal should not, however, be misinterpreted. Conservative development of our resources does not mean long delayed operations, nor does it mean broadly the inhibition of development for one industrial group as contrasted to that of another. It does mean, without any question, the use, and the full use, of all mineral and natural resources for the best interests of the public, both present and future. Irreplaceable minerals existing in a definite, though in many instances an unknown quantity, should not be recklessly exploited and wasted by this generation when it is certain that a growing posterity will certainly have as great or greater need for them. This problem when examined in terms of national welfare involves the fundamentals of the future political dominance and independence of this country among the nations of the world. In view of its great significance it is therefore very important that our coal and iron be mined, that our oil and gas be produced, that our wasting water power be utilized in every way so that the greatest efficiency will be obtained to the end that these resources which are in fact the only guarantee of a continuing progress and prosperity for this state and this nation may be made to last as long as possible.

OFFICE WORK OF THE SURVEY

The office routine of the Kentucky Geological Survey has been carried forward during the past biennium by a small staff of three regular or full-time employees, including the State Geologist. The statutes do not provide for an Assistant State Geologist, and for this reason the burden of an increasing general correspondence service to the people of the state is carried by the Director of the Survey. During the two-year period covered by this report, a total of 14,264 letters have been received, or an average of twenty-five per day. In reply 11,932 have been sent, giving an average of 25 per day. The smaller number of letters sent out as compared to those received is accounted for by the fact that a considerable portion of the correspondence calls for certain reports and maps and does not require other official reply. A detailed statement by months is given in the following statement:

CORRESPONDENCE THROUGH THE U. S. POST OFFICE AT FRANKFORT, KY., FOR THE TWO FISCAL YEARS

July 1, 1923 to June 30, 1925, Inclusive.

Year	Month	Letters received		Letters sent	
1923	July	720		440	
1923	August	608		542	
1923	September	561		387	
1923	October	585		529	
1923	November	632		569	
1923	December	743		676	
1924	January	565		434	
1924	February	619		468	
1924	March	659		420	
1924	April	574		533	
1924	May	649		404	
1924	June	432		357	
Total July 1, 1923 to June 30, 1924, Inclusive		7,248	7,248	5,739	5,739
Year	Month	Letters received		Letters sent	
1924	July	559		576	
1924	August	440		434	
1924	September	578		425	
1924	October	704		582	
1924	November	497		529	
1924	December	490		450	
1925	January	615		457	
1925	February	595		672	
1925	March	665		625	
1925	April	558		535	
1925	May	837		678	
1925	June	478		350	
Total July 1, 1924 to June 30, 1925, Inclusive		7,016	7,016	6,193	6,193
Grand total for the two years ending June 30, 1925			14,264		11,932
Daily average			25		22

One of the chief activities of the Kentucky Geological Survey is the furnishing of detailed and accurate geological and scientific information concerning the geology, mineral and natural resources of Kentucky. In this state and international ser-

vice during the past biennial period 23,087 geological reports and maps, an average of 40 per day, have been sent from this office in response to written or personal requests accompanied by separate amounts of postage as required by law as shown by the following statement:

KENTUCKY GEOLOGICAL SURVEY PUBLICATIONS DISTRIBUTED BY REQUEST

July 1, 1923 to June 30, 1925, Inclusive.

Year	Mo.	No. Mailed	Carried Away	Total	
1923	July	721	97	818	
1923	Aug.	279	128	407	
1923	Sept.	309	137	446	
1923	Oct.	417	129	546	
1923	Nov.	320	68	388	
1923	Dec.	425	140	565	
1924	Jan.	580	131	711	
1924	Feb.	1,130	748	1,878	
1924	Mar.	587	282	869	
1924	Apr.	798	43	841	
1924	May	883	80	963	
1924	June	821	143	964	
	Total for Fiscal Year 1923-1924			9,398	9,398

(Fiscal Year 1924-1925)

Year	Mo.	No. Mailed	Carried Away	Total	
1924	July	1,396	175	1,571	
1924	Aug.	646	126	772	
1924	Sept.	956	1,137	2,093	
1924	Oct.	1,222	127	1,349	
1924	Nov.	921	42	963	
1924	Dec.	710	72	782	
1925	Jan.	1,001	258	1,259	
1925	Feb.	890	120	1,010	
1925	Mar.	714	115	829	
1925	Apr.	860	165	1,025	
1925	May	1,019	290	1,309	
1925	June	610	117	727	
	Total for Fiscal Year 1924-1925			13,689	13,689
	Grand total for two fiscal years				23,087
	Daily average				40

The reports and maps distributed as indicated above pertain to every subject relative to the geology, soils and mineral resources of Kentucky. These publications have been sent, not only to every place in Kentucky, but throughout the United States; also Canada, Mexico, England, France, Germany, Japan and China. Requests for publications of the Kentucky Geological Survey through foreign libraries, industrial corporations and institutions is a growing one. The total amount of postage received in this service was re-used directly during the past biennium and has amounted to $1,559.78. Since this amount of postage thus obtained is in effect, a revolving unit being used as quickly as it is taken in, amounts in excess of a few dollars are never maintained in the office of the Survey. Of all the considerable amount of business which has proceeded through the U. S. post office for first-class correspondence and second-class mail or publications, not one penny has been drawn from the treasury of the state of Kentucky. In this respect the Kentucky Geological Survey is entirely self-supporting. The monthly and annual totals of postage received by the Kentucky Geological Survey follows:

RECEIPTS FOR POSTAGE FOR BIENNIUM

FIRST FISCAL YEAR

July 1, 1923 to June 30th, 1924, inclusive.

1923	July	$66.00	
	August	40.00	
	September	43.00	
	October	64.30	
	November	41.50	
	December	51.80	
1924	January	64.70	
	February	34.80	
	March	33.00	
	April	40.00	
	May	39.00	
	June	25.00	
	Total	$593.10	$593.10

SECOND FISCAL YEAR

July 1, 1924 to June 30, 1925, inclusive.

	July	$61.00	
	August	45.00	
	September	19.00	
	October	95.00	
	November	50.00	
	December	64.90	
1925	January	47.40	
	February	35.00	
	March	55.00	
	April	55.00	
	May	130.00	
	June	30.00	
	Total	$676.40	$676.40
	Grand total used in mailing parcel post packages, special delivery and registrations		$1,274.50
	Letters mailed the first fiscal year, 7248, at 2c		144.96
	Letters mailed the second fiscal year, 7016, at 2c		140.32
	Total postage used during the two fiscal years, 1923-1925		$1,559.78

RECOMMENDATIONS TO THE GOVERNOR AND LEGISLATURE

The natural wealth of Kentucky naturally falls into two major divisions: (1) Used wealth, and (2) unused wealth. Included in the broad classification of used wealth is found the productive agriculture, mineral and natural resources of this Commonwealth. The greater part of the unused or potential wealth of Kentucky at the present time exists in the form of undeveloped and to a large degree unknown mineral and natural resources. These resources are widely distributed throughout the state from the Big Sandy to the Mississippi river. Trite as it may seem, it is certainly a fact that practically every county of Kentucky has in it at the present time resources of one kind or another which have not been fully examined, prospected or developed. In some of the counties these undeveloped and unproductive resources are of vast extent.

The progress and prosperity of Kentucky are directly dependent upon the fullest utilization of the natural and mineral resources of this state, combined with general manufacturing industry. Agriculture, due to a combination of fortuitous and systematic circumstances, has been developed to a rather high point in Kentucky, particularly in the Bluegrass region, and in the western part of the state. Industrialization, slow in getting a foothold in this state because of the pronounced disinterest in manufacturing has within the last decade or two shown undeniable increase both in volume and diversification, particularly in that portion of Kentucky which adjoins the Ohio river. While during this same period a considerable amount of mineral resource development has gone forward in Kentucky, especially in the high grade bituminous and coking coal sections of Southeastern Kentucky, it is a lamentable fact that many mineral resources in this state are today unworked and undeveloped, due to the fact that little is known concerning their location, their quality or their quantity.

It is the function of the Kentucky Geological Survey to investigate for the people of the state as a whole the various mineral resources of this state, and to map them and their associated geology. This the Survey has been engaged in doing for a number of years, but up until recently has been severely handicapped because of the lack of sufficient funds with which to operate. Another drawback has been the lack of accurate topographical base maps on which detailed geology might be delineated. One of these obstacles was overcome at the last (1924) session of the legislature, when there was appropriated for the investigation of the mineral resources of Kentucky and their associated rocks, the sum of $40,000.00 in two separate appropriations.

Much of this money, in accordance with the governing act, has been spent during the past biennium in the investigation of high class road materials such as rock asphalt, limestone, sandstone and cement materials including clays. This work has now progressed to a point where it is indicated that much good may accrue to this state and a considerable saving to the taxpayers in the construction of roads if these investigations, which are now under way but incomplete, can be continued. It is therefore recommended that the general appropriation of $40,000.00 for

general geological purposes be continued throughout the next biennium.

During the last two years little, if any, progress has been made in the work of topographical base mapping in Kentucky, due to the fact that through error the biennial budget appropriation of $17,500.00 was vetoed in March, 1924. As a result of this veto the Kentucky Geological Survey has not been able to continue its comprehensive program of co-operative base mapping with the U. S. Geological Survey, Topographic Branch, an arrangement which had been in effect for many years previous to 1924.

The suspension of topographical base mapping has been severely felt by many lines of individual, corporation, state, county, municipal and departmental work. Operators of mineral properties have called for maps for undeveloped areas which might have been surveyed at this time had the money been available. Corporations looking to extensive operation of their undeveloped holdings have been hampered in their work of expansion on account of lack of maps for areas which are unsurveyed. The Kentucky State Department of Roads and Highways has repeatedly requested quadrangular topographic maps for unmapped areas which it has been impossible to supply. The lack of these maps has seriously impeded all branches of state and county road work in the field. In many instances inability to supply these maps has actually diverted proposed mineral development and investment from Kentucky into states adjoining, such as Ohio and West Virginia, Commonwealths which are entirely (100%) base mapped topographically.

The seriousness of the continuance of this condition in Kentucky is apparent. The loss of new wealth and added prosperity to this state because of retarding influences of unmapped and unknown areas can hardly be estimated, but must be very large. On July 1, 1925, of the 40,598 square miles comprising Kentucky, 20,723 square miles, or a little over 50% was actually base mapped topographically. At this time 19,875 square miles remain unmapped. The urgency of mapping this state has recently reached such proportions as to arouse entire sections of Kentucky to the point where active steps looking towards the completion of such base maps for restricted areas of a few coun-

RESOLUTION.

Whereas, it has been shown that but 50%[20,000 sq.miles] of Kentucky has been topographically based mapped,and that this work has been stopped because of no appropriations on the part of Kentucky, and

Whereas, Standard U.S.Geological Survey Topographic maps to the scale 1:24,000(1 mile tothe inch approximately)are not only of great value in all branches of modern road and highway construction but actually reduce considerably the cost of this work as well as facilitate its completion, and

Whereas, the completion of the topographic base map of Kentucky will greatly increase the development of the natural resources of this State and inhance its general prosperity as well as facilitate and effect a great economy in its road program, and

Whereas, it has been learned from the U. S. Geological Survey in Washington that an appropriation by the State of Kentucky of $75,000.00 for four or five years will complete the base map of this State, now therefore,

BE IT RESOLVED by the Commission of State Roads and Highways of Kentucky that the Governor of Kentucky and the State Budget Commission be and are hereby requested to make an annual appropriation for this work in the next Biennial Budget in the sum of $75,000.00 to be used by the Kentucky Geological Survey in cooperation with the Federal Geological Survey so that the topographical base mapping of Kentucky can be resumed and completed within the next four or five years.

M. C. Williams, Chairman

Resolution of State Highway Commission Relative to Co-operative Topographical Mapping.

ties in each case have been taken. Recent instances of such action have been found among the business men of Northeastern Kentucky who have organized themselves for the purpose of securing a new topographic base map of Greenup, Carter, Boyd, and Lawrence Counties to the scale of 1:62,500.

Civic action looking towards a similar base map has been taken in Nelson and Bullitt Counties, and requests for similar maps have come from unmapped areas in McCreary, Whitley, Clinton, McCracken, Calloway, Montgomery, Menifee, Rowan, Letcher, Bell, Bracken and many other counties. The State Highway Commission, sensing the importance of these topographical maps, and realizing that the ultimate cost of mapping to the Commonwealth might be very greatly reduced through their use coupled with a discontinuance of the present duplication of effort and public expenditure, prepared and forwarded October 27, 1925, the following resolution to the Governor:

RESOLUTION

Whereas, it has been shown that but 50% (30,000 sq. miles) of Kentucky has been topographically base mapped, and that this work has been stopped because of no appropriations on the part of Kentucky, and

Whereas, Standard U. S. Geological Survey Topographic maps to the scale 1:62,500 (1 mile to the inch approximately) are not only of great value in all branches of modern road and highway construction, but actually reduce considerably the cost of this work as well as facilitate its completion, and

Whereas, the completion of the topographic base map of Kentucky will greatly increase the development of the natural resources of this State and enhance its general prosperity as well as facilitate and effect a great economy in its road program, and

Whereas, it has been learned from the U. S. Geological Survey in Washington that an appropriation by the State of Kentucky of $75,000.00 for four or five years will complete the base map of this State, now, therefore,

Be it Resolved by the Commission of State Roads and Highways of Kentucky that the Governor of Kentucky and the State Budget Commission be and are hereby requested to make an annual appropriation for this work in the next Biennial Budget in the sum of $75,000.00 to be used by the Kentucky Geological Survey in cooperation with the Federal Geological Survey so that the topographical base mapping of

Kentucky can be resumed and completed within the next four or five years.

W. C. MONTGOMERY, *Chairman*
W. C. HANNA, *Secretary*
R. W. OWEN,
E. S. HELBURN.

SEAL

Approved by
State Highway Commission,
October 27, 1925.

In view of the present circumstances in which Kentucky finds itself with respect to its base mapping program, it is recommended that the sum of $75,000.00 per annum be appropriated during the next biennium for topographical base mapping in co-operation with the U. S. Geological Survey. The Federal Survey has indicated that in accordance with congressional enactment, it will be willing to cooperate on a dollar for dollar basis with the Kentucky Geological Survey, if any reasonable sum is provided. The mapping work can be started during the coming field season, and if appropriations are made as indicated above the entire topographical base map of Kentucky can be completed within the next four or five years, after which these appropriations will be unnecessary and should properly cease.

AVAILABLE MAPS AND REPORTS

There are now ready and available for immediate distribution through the Kentucky Geological Survey to any interested individual, corporation, company or institution requesting same a large number of special reports and maps, prepared by this and previous Surveys. These publications cover the general geology and development of many of the mineral resources of Kentucky. The early reports of the 1st and 2nd Geological Surveys (Owen, Shaler and Procter) are now entirely exhausted. The publications of subsequent Surveys, including the present or (Sixth) Kentucky Geological Survey, which are now available are listed in chronological sequence by titles and authors. The required postal charge and the number which are still available is indicated. The number of cloth bound reports now in stock is 8,023. The total number of paper bound pamphlets in stock relative to geology is 4,713. The total number of maps is 57,775.

The total number of maps and reports now available for distribution is 70,511. A request for any of these publications addressed to the Director, when accompanied by the required amount of postage in stamps (checks or money orders may be used) will be promptly filled until the edition is exhausted. The list given is essentially a duplicate of the one used in the official correspondence of the Kentucky Geological Survey.

LIST OF AVAILABLE MAPS AND REPORTS

January 1, 1926.

Instructions for Ordering: Single copies of any and all maps and reports listed hereunder will be mailed to any interested individual, corporation, company, or institution requesting same, providing the exact fee as indicated is forwarded with the request. Packages will not be sent express collect. This survey will not bill any applicant for required charges. Avoid delay and confusion by accompanying your letter of request with money order or check in the proper amount.

GEOLOGIC REPORTS

SERIES VI.

(1920-1926)

"WILLARD R. JILLSON SURVEY"

	Required Postal Charge Cents	Copies In Stock
Vol. 1.—Glass Sands of Kentucky. C. H. Richardson. 1920	50	75
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Vol. 16.—Wild Life in Kentucky. W. D. Funkhouser. 1925	Edition Exhausted	
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Total		4,576

SERIES V.
(1918-20.)
DEPARTMENT OF GEOLOGY AND FORESTRY

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Bulletin No. 4.—Contributions to Kentucky Geology. W. R. Jillson. 1920	50	286
		677

SERIES IV. (1912-18.)
"JOSEPH B. HOEING SURVEY"

Vol. 1, Pt. 1.—Oil, Gas, Barite, Fluorspar, Lead, Water Power, Coals of Big Sandy Valley, Geology of Tell City, Owensboro and Georgetown Quadrangles, Trenton Horizons, Chemistry of Trenton Rocks, Phosphate Deposits. 1913	50	61
Vol. 1, Pt. 2.—Fire Clays of Northeast Kentucky. Technology of Kentucky Clays, Coals of Upper Licking River, Coals of North Fork of Kentucky River, Oolitic Limestones of Warren Co., Asphalt Rock, Soil Surveys, Manufacture of Coke, Elevation and Astronomical Stations. 1913	50	229
Vol. 4, Pt. 3.—Coals of Clay County. J. M. Hodge and P. G. Russell. 1918	50	17
		307
Total of cloth and paper bound reports		12,736

SERIES III.* (1904-1912.)
"CHARLES J. NORWOOD SURVEY"

Bulletin No. 3.—Coals, Clays, Mineral Waters, etc., of Ky. Robert Peter. 1905	10	246
Bulletin No. 5.—Upper Ordovician Rocks of Kentucky and their Bryozoa. John M. Nickles. 1905	10	212
Bulletin No. 6.—Kentucky Clays. James H. Gardner. 1905	15	66
Bulletin No. 7.—Silurian, Devonian and Irvine Formation of East Central Kentucky. A. F. Foerste. 1906	10	167
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Bulletin No. 19.—Coals of the Central City, Madisonville, Calhoun and Newburg Quadrangles. F. M. Hutchison. 1912	20	148
Bulletin No. 20.—Coals of the Hartford Quadrangle. James H. Gardner. 1912	10	176
Bulletin No. 21.—Value of Dix River as a Source of Water Power. A. F. Foerste. 1912	10	475
Report of Progress for the years 1908 and 1909. C. J. Norwood	10	90
		2,473

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An Isothrustic Hypothesis. 1923	70
Principal Scientific Achievements of the Year 1923	35
A Bibliography of Geology, Ser. VI. Pamph. IV	23
1st Biennial Report Dept. of Geol. and Forestry. 1919	3
Transactions of Ky. Academy of Science. 1924*	123
Bibliography of John Day Region. 1923	96

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Geological Map of Kentucky, showing Oil and Gas Pools and Pipe Lines, Eastern and Western Coal Fields, Faults, Anticlines, Coal Mines, Igneous Dikes, etc., by W. R. Jillson and L. M. Sellier. January, 1923	50	200
Relief Map of Kentucky. G. H. Renshawe. 1924	25	2,700
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Topographic Map of Kentucky. R. L. Harrison. 1926. (In Press)	25	
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Structural Geology of Knox County. C. V. Theis. 1925	25	535
Structural Geology of Carter County. Perry and Hudnall. 1925	25	500

Photo by W. R. Jillson

OUTCROP OF DEVONIAN OIL SHALE

Much work both in the field and in the laboratory has been done on the oil shales of Kentucky by the Kentucky Geological Survey during the past two years. The deposits of this shale in Kentucky are very large and broadly distributed. The outcrop shown here is located 3 miles west of Clay City in Powell Co., Ky.

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Structural Geology of the region south of Irvine and Berea, Ky., including portions of Estill, Lee, Jackson, Madison and Rockcastle Counties. by Hudnall, Pirtle, Burroughs, Woodruff and Mayfield. 1924	25	375
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Structural Map of parts of Cumberland and Monroe Counties. J. S. Hudnall and G. W. Pirtle	25	745
Structural Geology Golconda and Cave-in-Rock Quads. Stuart Weller. 1925	25	560
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Structural Geology of Martin County (Big Lime). J. S. Hudnall. 1924	25	565
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Oil and Gas Map of Elliott County. A. B. Williams. 1925	25	325
Oil and Gas Map of Kentucky, small. W. R. Jillson	25	1,680
Geological Map of Woodford County, Ky. A. M. Miller. 1924	25	980
Geological Map of Webster County, Ky. L. C. Glenn. 1923	25	480
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Geological Map of Hartford Quadrangle. J. H. Gardner. 1925	25	410
Geological Map of Princeton Quadrangle. S. Weller. 1926	25	
Geological Map of Golconda and Cave-in-Rock Quadrangles. S. Weller. 1925	25	
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Geographic Map of Grant County. G. W. Pirtle. 1926	25	459
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Farm Map, Parts of Greenup and Carter Counties. C. D. Hunter and others. 1925	25	469
Isonville Oil Pool Structure	25	460
Geological Map of Kentucky, small, colored. W. R. Jillson. 1925	10	60

MISCELLANEOUS MAPS, SERIES II, III, IV, V.

Map Packet, 1919, contains the following: Oil and Gas Pools and Pipe Lines of Kentucky (small), Geology of Barren County, Geology of Allen County, Oil and Gas Map of Warren County, Structural Geology of Breathitt County, Structural Geology of Knott County, Kentucky-Appalachian Oil and Gas Fields, Geologic Map of Kentucky (small)	30	210
Map Packet, 1913, contains the following: Coal Mine Map—Upper Licking Valley, Coal Mine Map—Pond and Blackberry Creeks—Pike County, Economic Industries Map of Boyd, Carter and Greenup Counties, Economic Industries Map of a Portion of Rowan County, Coal Mine Maps, 1, 2, 3 and 4 of the Upper Big Sandy Valley, Geology of the Georgetown Quadrangle	30	250
Soil Map of Shelby County. U. S. Dept. of Ag. and Ky. Ag. St. 1916	25	135
Soil Map of Mason County. U. S. Dept. Ag. 1903	25	150
Soil Map of Rockcastle County. U. S. Dept. Ag. 1910	25	165
Soil Map of Jessamine County. U. S. Dept. Agr. 1915	25	40
Soil Map of Jackson's Purchase. Hoeing and Loughridge. 1886	25	280
Soil Map of Green County, by J. W. Norwood and S. C. Jones	25	600
Soil Map of Taylor County, by J. W. Norwood and S. C. Jones	25	425
Soil Map of Adair County, by J. W. Norwood and S. C. Jones	25	525
Soil Map of Webster County, by J. W. Norwood and S. C. Jones	25	680
Soil Map of Muhlenberg County. U. S. Dept. Ag. and Ky. Ag. St. 1923	25	210
Various Miscellaneous (small) and Old Maps and Sections		7,570

RECONNAISSANCE GEOLOGIC MAPS

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Map of Boyle and Mercer Counties, by J. B. Hoeing and W. M. Linney	25	375
Map of Madison County, by J. B. Hoeing and John R. Procter	25	675
Map of Meade and Breckinridge Counties. Loughridge and Hoeing. 1891	25	300
Map of Montgomery and Clark Counties, by J. C. Foles and W. M. Linney	25	725
Map of Washington and Marion Counties, by W. M. Linney and W. T. Knott	25	160
Map of Meade County Gas Wells, by R. H. Loughridge. 1891	25	100
Map of Trigg and Christian Counties, by J. B. Hoeing and F. J. Fohs	25	380
Map of Spencer and Nelson Counties, by W. M. Linney	25	55
Map of the Jackson's Purchase, by R. H. Loughridge. 1885	25	130
Generalized Geological Sections (2 plates) showing anticlines in Meade and Breckinridge Counties, by J. B. Hoeing and R. H. Loughridge. 1891	25	475
General Geological Section from Anderson County through Mercer and Garrard to Sub-Conglomerate Coal in Rockcastle (showing Kentucky anticlinal and synclinal) by W. M. Linney. Series II. Proctor	25	955
Total structural, geological, soil and miscellaneous maps		54,077

TOPOGRAPHIC SHEETS

U: S. Geological Survey and Kentucky Geological Survey in Cooperation.

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1. Beattyville Quadrangle, parts of Powell, Estill, Montgomery, Menifee, Lee, Wolfe, Breathitt, Clark, Owsley and Jackson Counties	9
2. Bowling Green Quadrangle, Warren, Allen and Simpson Counties	117
3. Brownsville Quadrangle, Warren, Edmonson and Butler Counties	9

Photo by W. R. Jillson

ROCK ASPHALT QUARRY. EDMONSON COUNTY, KY.

A notable expansion of the rock asphalt industry in Kentucky has taken place during the last two years, due to a growing national demand for the product in surfacing high type roads. This quarry on the waters of Bear Creek in Edmonson County is one of six active operations in Kentucky. Others are to be found in Grayson, Hardin and Breckinridge Counties, Ky.

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4. Buckhorn Quadrangle, parts of Perry, Leslie and Breathitt Counties	14
5. Calhoun Quadrangle, parts of Webster, McLean, Henderson, Daviess and Hopkins Counties	20
6. Camp Taylor Quadrangle, parts of Jefferson, Bullitt, Spencer, Shelby and Oldham Counties, Kentucky; and Taylor, Posey and Franklin Counties, Indiana	30
7. Cave-in-Rock Quadrangle, parts of Crittenden, Caldwell and Livingston Counties	
8. Central City Quadrangle, parts of McLean, Muhlenberg and Ohio Counties	28
9. Cincinnati E. & W. Quadrangle, parts of Boone, Kenton and Campbell Counties, Kentucky; and Hamilton and Clermont Counties, Ohio. 20 cents each	15
10. Clintwood Quad., parts of Pike Co., Ky.; Dickenson and Wise Cos., Va.	13
11. Cornettsville Quadrangle, parts of Leslie, Knott, Perry and Letcher Counties	11
12. Cub Run, parts of Grayson, Edmonson, Hart and Hardin Counties, Kentucky	500
13. Cumberland Gap Quadrangle, parts of Laurel, Knox, Clay, Leslie, Harlan, Bell and Whitley Counties, Ky., Lee Co., Va., Claiborne and Campbell Counties, Tenn.	10
14. Dawson Springs Quadrangle, parts of Hopkins, Christian and Caldwell Counties	14
15. Drakesboro Quadrangle, parts of Muhlenberg, Todd and Logan Counties	15
16. Dunmor Quadrangle, parts of Muhlenberg Butler, Ohio and Logan Counties	20
17. Earlington Quadrangle, parts of Webster and Hopkins Counties	25
18. Estillville Quadrangle, small portion of Harlan County, Ky., and Lee, Scott and Wise Counties, Virginia	30
19. Frankfort Quadrangle, parts of Franklin, Woodford, Shelby and Anderson Counties	500
20. Georgetown Quadrangle, parts of Scott, Fayette, Woodford and Franklin Counties	21
21. Golconda Quadrangle, parts of Livingston and Crittenden Counties, Ky., and Pope and Hardin Counties, Illinois	30
22. Harlan Quadrangle, parts of Harlan, Leslie and Knox Cos.	18
23. Harold Quadrangle, parts of Martin, Floyd and Pike Cos.	15
24. Harrodsburg Quadrangle, parts of Woodford, Jessamine, Boyle, Mercer, Fayette, Garrard, Lincoln and Anderson Counties	10
25. Hartford Quadrangle, parts of Butler, Ohio and Muhlenberg Counties	10

		Copies in Stock
26.	Henderson Quadrangle, part of Henderson County	36
27.	Hindman Quadrangle, parts of Knott and Floyd Counties	10
28.	Hurley Quadrangle, parts of Pike County, Ky., and Buchanan Co., Va.	30
29.	Hyden Quadrangle, parts of Leslie, Clay and Perry Cos.	10
30.	Inez Quadrangle, parts of Lawrence, Martin and Johnson Counties	10
31.	Ironton Quadrangle, small portion of Greenup County, Kentucky, and parts of Lawrence and Scioto Counties, Ohio	15
32.	Jefferson County. 40 cents each	20
33.	Jonesville Quadrangle, parts of Letcher, Leslie and Harlan Counties, Ky.; Lee County, Va., and Claiborne and Hancock Counties, Tenn.	5
34.	Kenova Quadrangle, parts of Greenup, Boyd, Carter, Lawrence and Elliott	5
35.	Kosmosdale Quadrangle, parts of Jefferson and Bullitt Counties	20
36.	Leitchfield Quadrangle, parts of Grayson, Edmonson and Butler Counties, Ky.	500
37.	Little Muddy Quadrangle, parts of Butler and Warren Counties	12
38.	Lockport Quadrangle, parts of Owen, Henry, Shelby and Franklin Counties	15
39.	London Quadrangle, parts of Rockcastle, Pulaski, Jackson and Laurel Counties	16
40.	Louisville Quadrangle, parts of Jefferson and Bullitt Cos.	30
41.	Madisonville Quadrangle, parts of Hopkins, Muhlenberg and McLean Counties	24
42.	Mammoth Cave Quadrangle, parts of Edmonson, Barren, Warren and Hart	450
43.	Manchester Quadrangle, parts of Jackson, Owsley, Clay, Leslie, Laurel, Perry, Breathitt and Knox	4
44.	Mattewan Quadrangle, parts of Pike County, Ky.; Mingo and Logan Cos., W. Va.	35
45.	Monticello Quadrangle, parts of Wayne, Russell and Pulaski Counties	26
46.	Morganfield Quadrangle, parts of Union and Webster Cos.	35
47.	Mt. Eden, parts of Shelby, Anderson and Franklin Counties, Kentucky	25
48.	Naugatuck Quadrangle, parts of Martin and Lawrence Cos.	20
49.	Newburg Quadrangle, parts of Henderson and Daviess Counties	24
50.	New Haven Quadrangle, part of Union County	50
51.	Nolansburg Quadrangle, parts of Harlan County, Ky., and Lee County, Va.	15

		Copies In Stock
52.	Nortonville Quadrangle, parts of Hopkins, Muhlenberg and Christian Counties	13
53.	Owensboro Quadrangle, part of Daviess County	25
54.	Paintsville Quadrangle, parts of Lawrence, Johnson, Morgan and Magoffin Cos.	14
55.	Pikeville Quadrangle, parts of Pike and Floyd Counties	12
56.	Pound Quadrangle, parts of Pike and Letcher Counties	13
57.	Princeton Quadrangle, parts of Caldwell and Lyon Cos.	20
58.	Prestonsburg Quadrangle, parts of Johnson, Floyd and Magoffin Counties	24
59.	Prospect Quadrangle, parts of Jefferson and Oldham Cos.	25
60.	Providence Quad., parts of Crittenden, Union, Webster, Caldwell and Hopkins Counties	25
61.	Regina Quadrangle, parts of Pike County, Ky.; Dickenson and Buchanan Cos., Va.	20
62.	Richmond Quadrangle, parts of Jessamine, Fayette, Madison, Estill, Jackson and Garrard Counties	2
63.	Salyersville Quadrangle, parts of Menifee, Morgan, Wolfe, Magoffin and Breathitt Counties	5
64.	Scottsville Quadrangle, parts of Allen, Barren and Warren Counties, Kentucky	20
65.	Sebree Quadrangle, parts of Henderson and Webster Cos.	46
66.	Shawneetown Quadrangle, parts of Union and Crittenden Cos., Ky.; Hardin and Gallatin Cos., Ill.	20
67.	Spring Lick, parts of Ohio, Butler and Grayson Counties	450
68.	Sutherland Quadrangle, parts of Daviess, McLean and Ohio Counties	30
69.	Taylorsville and LaGrange Quadrangle, parts of Jefferson, Bullitt, Spencer, Shelby and Oldham Counties	25
70.	Tell City Quadrangle, parts of Hancock and Daviess Cos.	15
71.	Troublesome Quadrangle, parts of Perry, Breathitt and Knott Counties	10
72.	Uniontown Quadrangle, parts of Union and Henderson Counties	20
73.	Whitesburg Quadrangle, parts of Letcher and Knott Cos.	12
74.	Whitesville Quadrangle, parts of Daviess, Hancock and Ohio Counties	13
75.	Williamsburg Quadrangle, parts of McCreary, Whitley, Pulaski, Laurel, Knox and Bell Counties, Kentucky, and Scott, Campbell, Claiborne Counties, Tennessee	15
76.	Williamson Quadrangle, parts of Pike and Martin Counties, Ky.; and part of Mingo Co., W. Va.	12
	Total topographical quadrangular maps	3,698
	Grand total all maps	57,775
	Grand total of all reports, papers and maps	70,511

ADDENDUM

The fundamental importance of the work of the Kentucky Geological Survey in mapping and detailing the geology and mineral resources of this Commonwealth, so generally recognized throughout the state, has been specifically recognized by Governor William J. Fields. Recently in his official biennial message delivered in person before the General Assembly of Kentucky, on January 6, 1926, the Governor made the following important statement relative to the development of the mineral wealth of Kentucky. Late publication of this administrative report of the Survey allows its inclusion here in addendum:

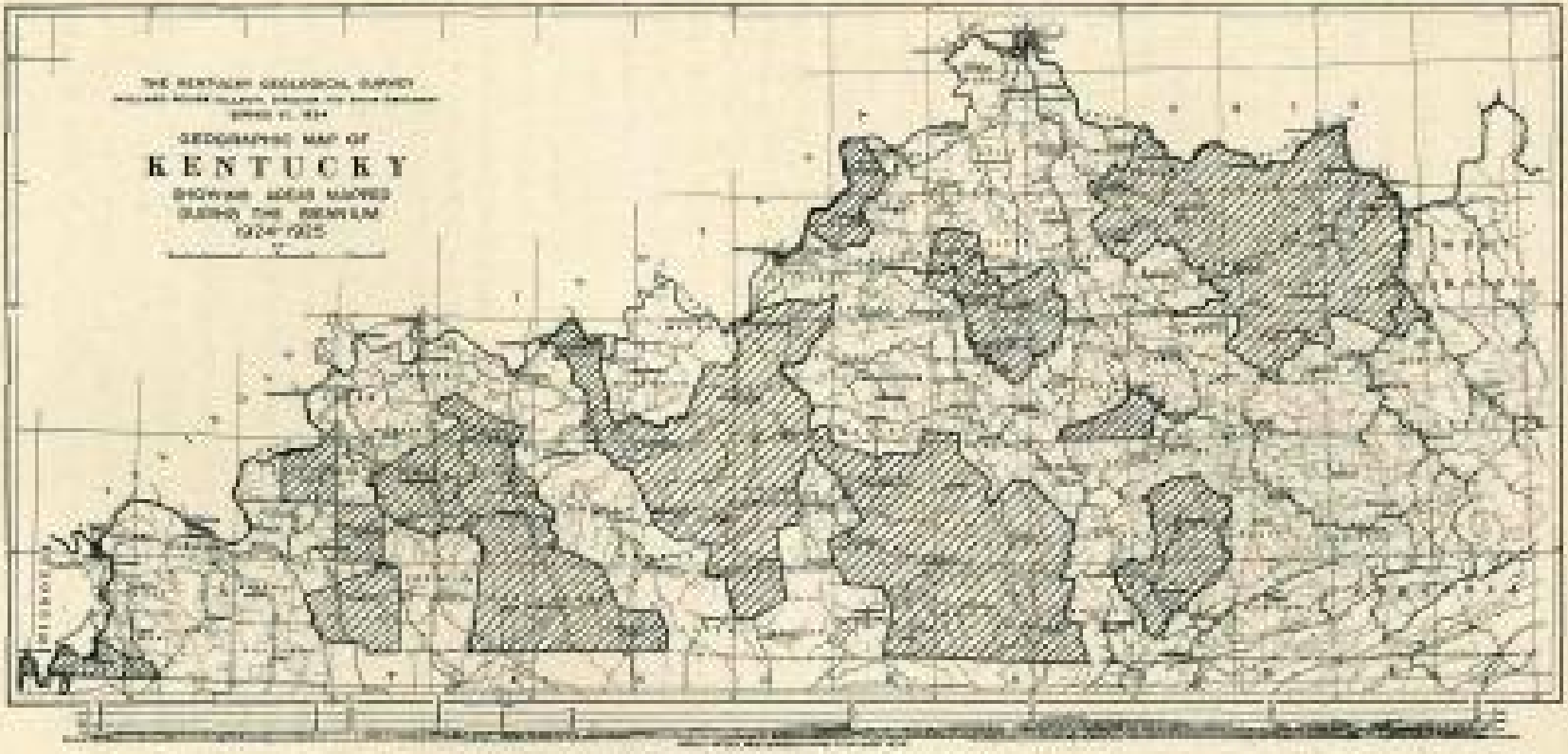
MINERAL RESOURCES AND BASE MAPPING*

"Kentucky, with its more than forty thousand square miles, is richly endowed with natural and mineral wealth. Coal, iron, gas, potters' clay, flint fire clay, mineral waters, rock asphalt, fluorspar, and many other minerals abound. Although the state's mineral resources are now only about 25% developed, their value within recent years has attained the annual figure of about $200,000,000.00. At the present time 51% of the area of Kentucky is topographically base mapped. The fact that nearly one-half of this state is unmapped is the direct cause of annually diverting many millions of dollars of investment from Kentucky into such adjoining states as Ohio, West Virginia, and others, which are one hundred per cent base mapped at the present time.

"In order to build up industry, increase invested capital, facilitate highway construction, and produce a more widespread and lasting prosperity, Kentucky needs to complete at once her topographical base map. For this purpose an appropriation of $75,000.00 annually for the next biennium is recommended, to be used by the Kentucky Geological Survey in dollar for dollar cooperation with the United States Geological Survey, in a comprehensive program, which will early complete this needed mapping inventory of the state's area and mineral wealth. At the same time the present annual appropriation of $40,000.00 for geological investigation of road materials and other important mineral resources should be maintained."

*Biennial Message of Governor W. J. Fields before the General Assembly of Kentucky, Jan. 6, p. 55, Frankfort, Ky. 1926.

INDEX TO AREAS MAPPED STRUCTURALLY



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